ANNUAL REPORT ON THE ENVIRONMENT

CHAPTER I

WATER RESOURCES

I. WATER RESOURCES

A. OVERVIEW

The water resources of Fairfax County include its streams, groundwater, ponds and lakes. These serve as sources of drinking water, recreation, and habitat for a myriad of organisms. One-third of the land in the Fairfax County Park system, around 5,000 acres, is stream valley parkland. These stream valleys are significant corridors for the County trails system and wildlife.

1. Streams

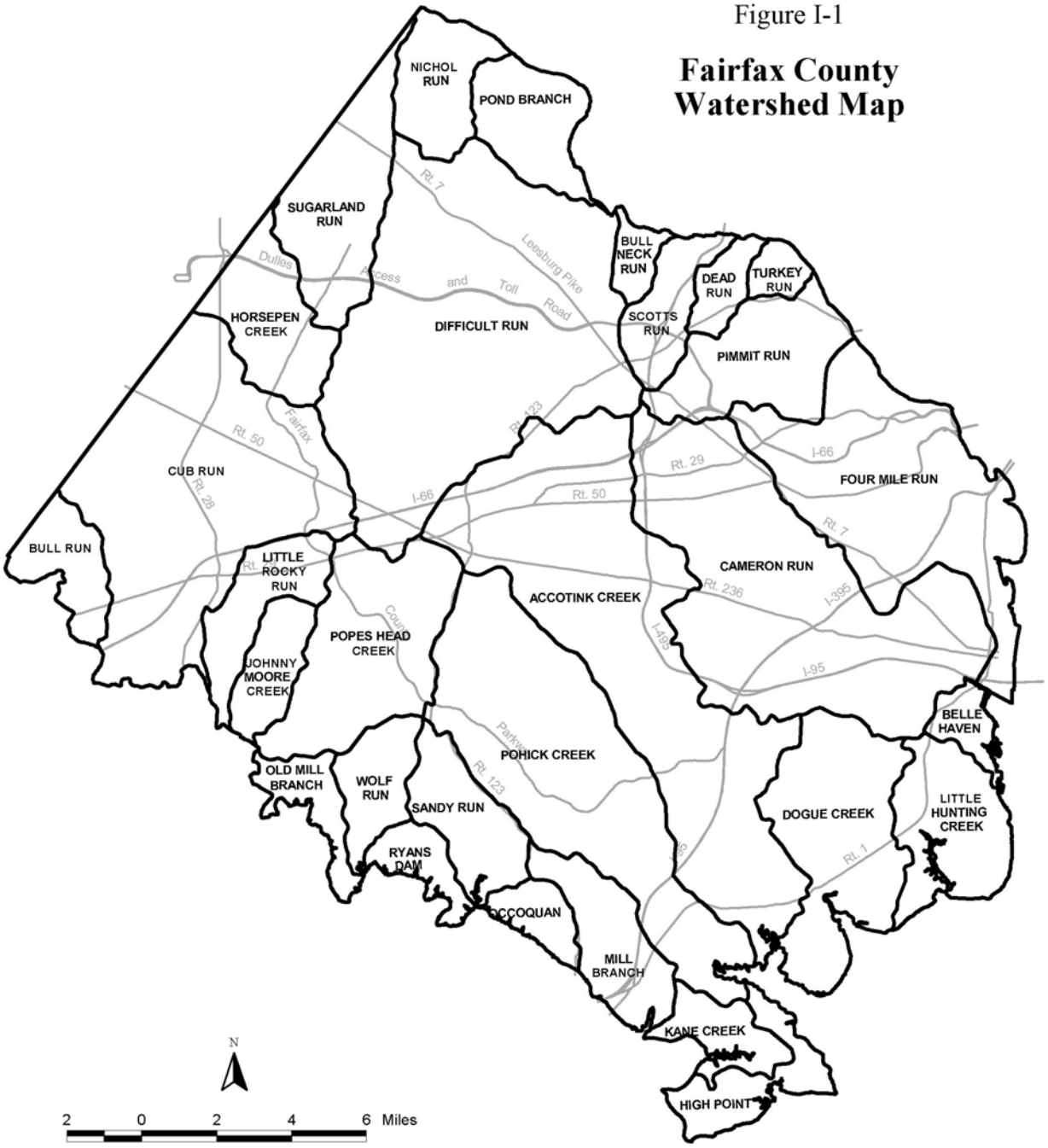
Fairfax County is criss-crossed by a variety of natural streams, often called runs or creeks. These streams are considered flowing water habitats. Rainfall soaks into the earth and drains to low points within the surrounding land, then emerges from the ground as seeps, springs and trickling headwaters. These tiny threads of running water join with others in the same drainage area to create a stream system. A stream is a system of fresh water moving over the earth's surface. There is a natural progression in size from the smallest tributaries to the largest rivers into which they eventually flow. Perennial streams flow throughout the year and intermittent streams flow only part of the year. There are over 900 miles of perennial streams within Fairfax County fed by smaller intermittent headwater streams.

2. Watersheds

A watershed is an area from which the water above and below ground drains into a particular stream, river system or larger body of water. Everyone in Fairfax County lives in a watershed with a name and drainage boundaries. The larger stream watersheds usually have sub-basins. There are 30 separate drainage basins or watersheds within the County (Figure I-1). For example, the largest watershed in Fairfax County, Difficult Run (58 square miles) has ten streams which drain into the main stream, Difficult Run. It, in turn drains into the Potomac River. The Potomac River watershed is a subbasin of the even larger watershed, the Chesapeake Bay watershed, which is 64,000 square miles and extends from New York through Pennsylvania, Delaware, West Virginia, Maryland, Virginia, and the District of Columbia. All Fairfax County streams are in the Potomac River watershed and subsequently the Chesapeake Bay watershed**.**

Figure I-1

Fairfax County Watershed Map



3. Stream Ecosystems and Communities

Within a stream are shallow areas called riffles where the velocity is rapid and the bottom consists of boulders, stones, gravel and/or sand. Dissolved oxygen levels are high because water is flowing over rocks, mixing air into the tumbling water. Alternating with riffles are deeper pools and runs where water speed slows and small particles of mineral and organic matter fall to the bottom and oxygen levels are reduced. Each of these stream regions has a diverse community of plants and animals which spend all or part of their life cycles in the water.

4. Communities

The aquatic food chain begins with leaves and other decaying plant and animal material called detritus. These are carried into the stream from the surrounding forests and fields by wind and water runoff. Food sources also include aquatic vegetation such as algae. Bottom–dwelling (benthic) Macro (large) invertebrates (back-boneless) animals eat this organic matter. These include snails, clams, aquatic worms and crustaceans such as crayfish, but the most ecologically important are the aquatic insects such as stoneflies, mayflies, caddisflies, and true flies. In turn, these macroinvertebrates are eaten by fish, birds, and other streamside wildlife, such as frogs, salamanders and small mammals.

5. Oxygen

Oxygen is vital to organisms that live in a stream just as it is to terrestrial animals. Submerged animals use oxygen dissolved in the water. Most aquatic insect larvae, such as mayflies and stoneflies, absorb oxygen through their body walls but many are aided by the use of structural gills. Fish absorb oxygen by drawing water in through the mouth where it passes over internal gills. High levels of dissolved oxygen are essential to the life functions of a healthy stream community.

6. Trees, Wetlands, and Buffers

A buffer of trees lining the banks of streams is another essential part of a healthy stream system. The temperature in a stream greatly affects how much oxygen it can hold. Since warmer water holds less oxygen, trees are vital along the bank or edge of stream or river. Shade from the tree canopy maintains cool water temperatures so the water will hold more oxygen.

Tree cover also provides food and floating detritus for shelter when leaves and branches fall into a stream. Streamside forests offer food, nesting sites, and protection to a great diversity of streamside wildlife including birds, turtles, beaver and snakes. Tree roots stabilize fragile stream banks and give cover to fish**,** crayfish and aquatic insects. Forested buffers absorb high percentages of excess nutrient runoff.

Wetland areas adjacent to streams can be forested or open wetlands. These wetlands serve as transitions to stream channels and help to attenuate the affect of stormwater and remove pollutants.

7. Nutrients

Nitrogen and phosphorus are nutrients essential to the growth and development of all plants. But an overabundance of either can damage stream ecosystems dramatically. Forested buffers can retain and utilize as much as 89% of the nitrogen and 80% of the phosphorus runoff associated with land use practices. In excess, these nutrients become major pollutants causing the rapid growth of algae in streams, rivers, lakes and estuaries. When the algae dies and begins to decay, the bacteria breaking down the algae uses up the dissolved oxygen necessary for other aquatic life.

8. Groundwater and the Water Cycle

Most of the water on earth, almost 98%, is in liquid form, in the oceans, lakes, ponds, rivers, and streams. Of the remaining 2%, some water is frozen in the polar ice and glaciers, some in the soil and some in the atmosphere in the form of vapor and some in the bodies of living organisms.

Water is evaporated from the oceans, and in much smaller amounts, from moist soil surfaces, from the leaves of plants and from the bodies of other organisms. This water, now water vapor, is carried up in the atmosphere by air currents. Eventually these water molecules fall to the Earth's surface as rain or snow. Much of the water that falls onto the land runs off into streams, then rivers and eventually reaches the ocean.

Some of the water that falls on the land percolates down through the soil until it reaches a zone of saturation. In the zone of saturation, all pores and cracks in the rocks and soils are filled with water (groundwater) The upper surface of the zone of saturation is called the water table. This groundwater provides the base flow in streams and is the reason that streams and rivers have flow when it is not raining. It is this groundwater that is the source of water in wells and provides water for plants through their roots. Eventually all groundwater reaches the oceans, thereby completing the water cycle.

B. POLLUTANTS AND OTHER IMPACTS ON STREAMS

1. Point and Nonpoint Source Pollution

Water-polluting substances originate from either nonpoint or point sources. Nonpoint sources (NPS) include surface runoff, atmospheric deposition, and groundwater flow. Because of their diffuse and intermittent nature, NPS are difficult to control. NPS pollutant loads are greatest following rainfall events. A significant part of the NPS load consists of nutrients, including nitrogen and phosphorus (organic matter, fertilizer), that

are substances that stimulate algal growth. Other NPS pollutants are sediment (from eroding lands, construction sites, and stream banks during high-flow, high-velocity conditions), toxics (oil, paint, chemicals and metals), pathogens-fecal coliform bacteria (animal waste, failing septic and leaking sewer systems), and trash.

Point sources are specific locations that discharge pollutants. They are relatively constant and provide a steady flow of pollutants. In the Potomac Basin, most point sources are either wastewater treatment plants (WWTPs) or industrial discharges. Point sources contribute relatively small portions of the nutrient loads during high flows and the majority during low flows.

2. The Effect of Imperviousness on Streams

As development occurs, impervious surface increases as driveways and buildings are placed on land that once had trees and other vegetative cover that absorbed water and its contents. With the increase in impervious surface and loss of vegetative cover, there is a concurrent increase in the amount and speed of stormwater running off the land carrying sediment to nearby streams. Sediment is a major non-point source pollutant reaching streams and rivers that drain to the Chesapeake Bay. Silt and sand scour stream channels, which erodes the banks and causes loss of tree cover. This in turn allows water temperature increases. This silt and sediment also gets deposited on the bottom covering where macroinvertebrates live, cutting off their oxygen supply. This change in bottom substrate usually results in a change in the diversity of organisms--a loss in the numbers and kinds of animals and plants in stream. There is usually a concurrent increase in the numbers of floods that occur where water spills over the banks of streams and onto adjacent lowlands. Over time, this increased flooding and sediment depositions leads to channel widening, loss of pools and riffles and increased pollutant levels. In urban and suburban watersheds, rain flows off impervious surfaces like parking lots and highways, carrying oil and other automobile wastes into streams. During summer storms, these heated surfaces contribute to raising the temperature of water runoff into streams.

C. STREAM AND WATERSHED ANALYSES

Ongoing testing is conducted by the, the Fairfax County Department of Public Works and Environmental Services (DPWES), Fairfax County Health Department, the Virginia Department of Environmental Quality (VDEQ), and other organizations and agencies. The Audubon Naturalist Society, the Northern Virginia Soil and Water Conservation District, and the Health Department Adopt-A-Stream program also provide volunteer help and data. At present the Health Department and the Department of Public Works and Environmental Services are both doing comprehensive monitoring of Fairfax County streams. The summary of all this data has provided the first comprehensive understanding of the condition and health of Fairfax County's streams.

1. Countywide Stream Assessments

a. Countywide Stream Protection Strategy Baseline Study

i. History

In September, 1997, the Fairfax County Board of Supervisors requested that staff from the Department of Public Works and Environmental Services (DPWES) evaluate the Montgomery County Maryland, Countywide Stream Protection Strategy to determine its applicability in addressing water quality issues and provided an initial allocation of $250,000. Upon completion of the evaluation in 1998, the Board approved an additional $250,000. Work was initiated in September of 1998, was completed by December 2000 and was published in January 2001. This study gives a holistic ecological assessment of all County streams.

ii. Study Parameters

All major non-tidal streams and tributaries within the 30 watersheds of the County have been assessed. The field component of this assessment involved the collection of data from a total of 138 sites/reaches, 13 of which were established as Quality Assurance/Quality Control (QA/QC) sites. Of the 125 principal monitoring sites, 114 were reflective of conditions within Fairfax County and 11 were sampling locations in nearby Prince William Park and used to aid in the development of "reference conditions" to which all sites were compared. Data collected on the health of streams included the four components and a numeric ranking for overall quality was assigned (See Figures I-2 through I-5):

1) Fish taxa present (numbers and diversity of fish);
2) Index of biotic integrity (the numbers and kinds of benthic macroinvertebrates present);
3) General evaluation of localized watershed and stream features including stream channel and adjacent steam valley habitat, stream morphology; and
4) Calculations of the overall percent impervious cover within each watershed based on upon available Fairfax County GIS data.

The County will continue long term monitoring of streams with a 5-year rotating schedule of sampling so that each site will be resampled at least every five years. Additional data on smaller tributary streams will continue to be provided by volunteer water quality monitors from the Northern Virginia Soil and Water Conservation District and Audubon Naturalist Society. (See below for description of these Volunteer Monitoring Programs.)

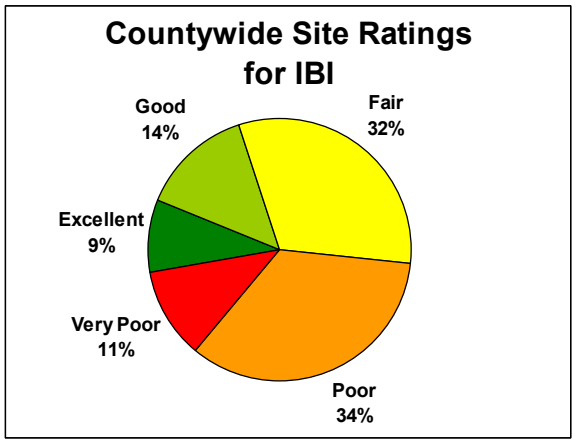


Figure I-2. Percentage of SPS monitoring sites scoring in each of the five IBI quality categories.

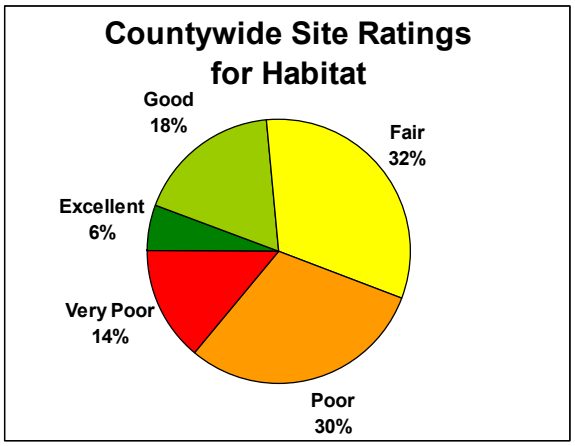


Figure I-3. Percentage of SPS monitoring sites scoring in each of the five Habitat quality categories.

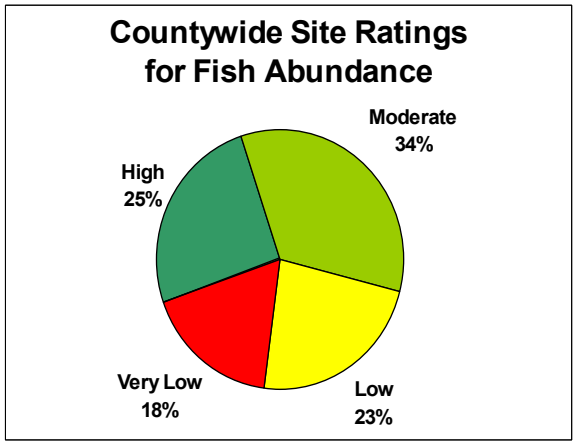


Figure I-4. Percentage of SPS monitoring sites scoring in each of the four Fish abundance categories.

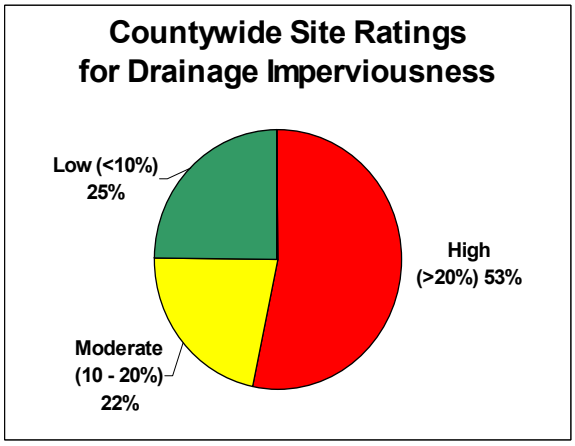


Figure I-5. Distribution of Imperviousness at SPS monitoring sites.

Source of Figures I-2 through I-5: Fairfax County Department of Public Works and Environmental Services, *Fairfax County Stream Protection Strategy, Baseline Study*, January, 2001.

iii. Ranking and Results

The ultimate numeric score for each sampling location reflects the site's degree of departure from reference or "highest-quality" conditions. These composite values were then assigned to one of the following qualitative categories: Excellent, Good Fair, Poor and Very Poor.

Using an indicator of biological integrity (IBI) as a basis, the county stream site were ranked: Excellent - 8.6%, Good – 14.7%, Fair – 31%, Poor 32.8% and Very Poor –12.9%. Those watersheds that were in good and excellent health had the least amount of impervious surface and the watersheds that were most heavily degraded had the greatest impervious surface (Figure I-6).

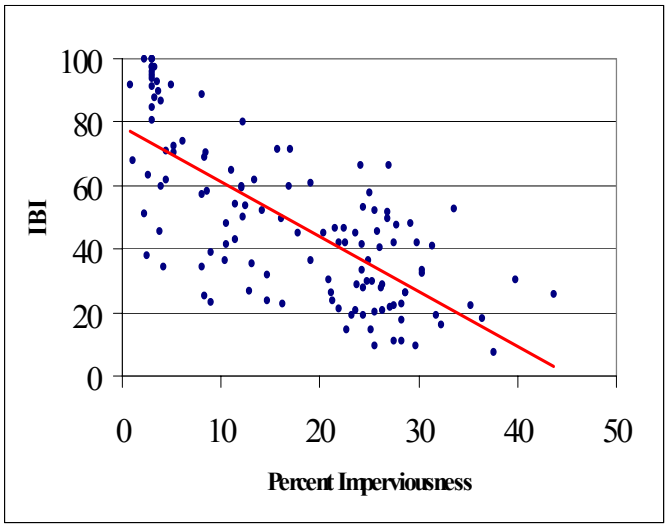


Figure I-6. Trend line indicating that Biological integrity, as measured by an Index of Biotic Intetrity (IBI) for benthic macroinvertebrates, generally decreases with increasing percent imperviousness. Source: Fairfax County Department of Public Works and Environmental Services, *Fairfax County Stream Protection Strategy, Baseline Study*, January, 2001.

iv. Recommended Management Strategies

Based on overall stream rankings and projected development within each watershed, three management categories were established to provide recommendations for future efforts:

1) Watershed Protection – Watersheds in this category will be areas with low development density and which currently possess streams with biological communities that are relatively healthy and have a composite ranking of Good or Excellent. The primary goal of this category is to preserve biological integrity by taking active measures to identify and protect, as much as possible, the conditions responsible for the current high- quality rating of these streams.

2) Watershed Restoration Level I- Watersheds in this category have a composite rating of Fair or, rarely, Poor and a projected imperviousness of less than 20%. The primary goal of this category is re-establish healthy biological communities by taking active measures to identify and remedy causes of stream degradation, both broad scale and site-specific.

3) Watershed Restoration Level II –Watersheds here have a composite rating of Poor, Very Poor or rarely, Fair and a projected imperviousness of greater than 20%. This category will likely be categorized by high development

density and significantly degraded stream segments. The primary goal is to prevent further degradation and to take active measures to comply with Chesapeake Bay initiatives.

The report is online at:
http://www.co.fairfax.va.us/gov/dpw/spss/homepage.htm

v. 2001 Update on Countywide Stream Assessment

During 2001, the Stream Protection Strategy (SPS) program completed sampling at 29 randomly selected sites chosen from among the 125 monitoring locations established during the 1999 baseline study. This represents about 25% of the original monitoring sites. This sampling scheme will be repeated annually. The 11 reference sites within Prince William Forest Park have been and will continue to be monitored on an annual basis.

In an attempt to assess possible seasonal influences on fish distribution patterns - and their resulting impact on the development of useful indices – a spring sample , in addition to the summer sampling protocol, was added. The report for 2001 should be available on line at: http://www.co.fairfax.va.us/gov/DPWES/environmental/SPS_Main.htm

The results of the study do not show significant changes from the original baseline data.

b. Volunteer Water Quality Monitoring Programs

i. Northern Virginia Soil and Water Conservation District (NVSWCD)

The Northern Virginia Soil and Water Conservation District (NVSWCD) manages a water quality monitoring program in Fairfax County, which is conducted by qualified volunteers. The program includes training and certification of monitors, data management and analysis, and quality control. Four times a year, volunteers conduct a biological assessment, using the Save Our Streams protocol. They determine the general quality of the water by evaluating the type and diversity of aquatic macroinvertebrates. They also record their observations of the surrounding watershed, including land uses, the amount of streamside and stream bank vegetation, tree canopy, and signs of erosion and other pollution. The monitors conduct water chemistry tests for temperature, turbidity, and nitrates, to assess the water quality. In 2001, 35 sites reported winter data, 30 reported in the spring, 61 in the summer and 36 in the fall.

ii. Audubon Naturalist Society (ANS)

ANS also manages a volunteer water quality monitoring program in the region that currently includes 30 monitors, with an average of four monitors for each of the nine sites in Fairfax County. Two sites are in E. C. Lawrence Park and are monitored by Park staff. The ANS program uses a modified version of the EPA's Rapid Bioassessment II protocol, which includes assessment of in-stream and streamside habitat parameters and a survey of benthic macroinvertebrate populations. There are three required monitoring sessions (May, July, and September) and an optional winter monitoring session between December and February. ANS staff performs data entry and quality control activities. ANS also furnishes all monitoring equipment and training. Monitor training includes macroinvertebrate identification (order and family level), protocol practicum, habitat assessment, and benthic macroinvertebrate adaptations. Monitors are recruited in semi-annual introductory workshops. The water quality monitoring program is part of a larger watershed awareness program that includes slide show and video presentations, watershed walks, and other presentations.

iii. Fairfax County Park Authority

Staff at several Park sites has worked with citizens on stream monitoring projects. Three nature centers and Lake Accotink Park are working to collect long term data at established monitoring points. The Park Authority has also recruited a volunteer to act as a Stream Cleanup Coordinator. This individual will work to organize stream clean-up events in non-staffed stream valley parks.

2. Fairfax County Health Department Water Quality Report

The Division of Environmental Health in the County Health Department produces the other comprehensive review of Fairfax County streams. In 2001, data were collected from 84 sampling sites throughout 25 of 30 watersheds in Fairfax County. A total of 1,656 stream samples were collected for analysis.

Twenty-seven site visits were made by the Health Department to investigate 12 stream complaints in 2001. One(1) complaint dealt with dumping and trash in streams, six(6) were for color and odor, two(2) dealt with possible sewer line breaks, two (2) with runoff problems, and one(1) was related to a broken water main in the stream bed.. The twelve complaints were initially investigated by the Fairfax County Health Department and referred to the proper agency or resolved utilizing Health Department procedures and local ordinances .

The overall water quality of the streams in Fairfax County is considered fair for fecal coliform bacteria and good for chemical and physical parameters by the Health Department.

The report is online at: http//www.co.fairfax.va.us/service/hd/strannualrpt.htm.

a. Fecal Coliform

These bacterial organisms are found in the intestinal tracts of warm-blooded animals including humans, and therefore can be indicative of fecal contamination and the possible presence of a pathogenic organism. In surface waters, Virginia Water Quality Standards have a dual standard for fecal coliform bacteria: 1) An instantaneous standard of 1,000 fecal coliform bacteria per 100 ml of water, which is applicable for data sets with one or less sample per month, and 2) a geometric mean standard of 200 fecal coliform bacteria per 100 ml of water, which can only be calculated when two or more samples are available in a 30 day period.

--In the watersheds tested, Fairfax County streams met the standards of < 200 F.C./100 ml (considered GOOD) 16% of the time. Several streams had readings exceeding 1,000 F.C./100 ml. The Fecal Coliform Mean remains in the mid 500 range at 567 f.c./100 ml.

Because of excessive and persistently high coliform counts in Accotink Creek and Four Mile Run, TMDLs (Total Maximum Daily Loads) are underway. See description Stream Reports.

b. Dissolved Oxygen

The presence of dissolved oxygen (D.O.) is essential for aquatic life, and the type of aquatic community is dependent to large extent on the concentration of dissolved oxygen present. Dissolved oxygen standards are established to ensure the growth and propagation of aquatic ecosystems. The minimum Virginia state standard for dissolved oxygen is 4.0 mg/l.

--Ninety-nine percent (99%) of the samples collected for determination of D.O. were above the 4.0 mg/l range. Of the remaining 1%, a little over one-third of the samples below 4.0 mg/l were from two sampling sites Wolf Run Creek and Little Hunting Creek. And half of the samples below 4.0 mg/l were related to low rainfall during the months of September (2.2 inches) and November (0.8 inches)

The Mill Branch sampling station showed readings below 4.0 only 50% of the time (2 out of 4 samples collected in 2000). This sampling site is located downstream from a debris landfill and could indicate that organic contaminants are entering the stream. This site has been dropped from the sampling schedule after 4 samples were collected in 2000 and it was determined that the amount of available water to sample was insufficient for proper evaluation. This sampling site is monitored by Virginia's Department of Environmental Quality-Waste Management Division.

c. Nitrate Nitrogen

Nitrate Nitrogen is usually the most prevalent form of nitrogen in water because it is the end product of aerobic decomposition of organic nitrogen. Nitrate from natural sources is attributed to the oxidation of nitrogen in the air by bacteria and to the decomposition of organic material in the soil. Fertilizers may add nitrate directly to water resources. Deposition of nitrogen compounds from air pollution also occurs. Nitrate concentrations can range from a few tenths to several hundred milligrams per liter. In non-polluted water, they seldom exceed 10 mg/l. Nitrate is a major component of human and animal wastes, and abnormally high concentrations suggest pollution from these sources.

--The samples for nitrate nitrogen ranged from a low of 0.01 mg/l to a high of 6.1 mg/l. The overall nitrate nitrogen geometric mean was 0.6 mg/l, well below the maximum limit of 10 mg/l No samples were above the maximum contaminate level of 10 mg/l**.** Station 25-04 (Old Mill Branch watershed) and Station 05-02 (Bullneck Run) had the highest geometric mean of all samples collected in 2001 from the high of 6.1 mg/l in February to a low of 0.1 in October.

d. Phosphorus (Total)

Phosphorus is found in natural water in the form of various types of phosphates. Organic phosphates are formed in the natural biological process--by organisms existing in the water, contributed to sewage in body wastes and food residues, and/or formed in the biological treatment process for sewage. Condensed phosphates and orthophosphates are found in treated wastewater, laundry detergent, commercial cleansing compounds, and fertilizers. Phosphorus is essential to the growth of organisms and is usually the nutrient that limits growth of organisms in a body of water. Therefore the discharge of raw or treated sewage, agricultural drainage, or certain industrial wastes may stimulate nuisance quantities of photosynthetic aquatic organisms and bacteria.

-- There is no established limit for phosphorus in stream water. This year's geometric mean of 0.10 mg/l does not indicate a significant increase over prior year's average

e. Temperature

The existence and composition of an aquatic community also depends greatly on the temperature characteristics of a body of water. The maximum standard for free flowing streams is 89.9^{o} F (32^{o} C).

--The temperature range for all stream water samples collected in 2000 was 32^{o} F for the low in January and 84^{o} F for the high in August. The average temperature was 55^{o} F.

f. Heavy Metals and Toxins

The presence of heavy metals in stream water indicates possible discharge of household and industrial waste into streams. Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, and Silver are monitored for based on their occurrence in industrial and household waste, their potential health hazards, and as part of the Virginia Department of Environmental Quality water requirements.

-- All results are within required limits**.**

g. pH

Stream pH is an important factor in aquatic systems. The pH range of 6.0 - 9 generally provides adequate protection of aquatic life and for recreation use of streams.

--The pH ranged from a low reading of 5.2 to a high of 9.3 for all samples. Fifteen samples were above the 9 limit and six samples were below the 6.0 limit. Follow up testing indicated normal pH.

h. Summary

The average geometric mean for fecal coliform at several of the stream sample sites is approaching and surpasses 1000 f.c./100 ml. (This is definitely not in the good range). The chemical and physical parameters have remained constant over the past five years. Therefore, the Health Department considers the overall water quality of Fairfax County watersheds fair for fecal coliform and good for chemical and physical parameters.

The Health Department ends its Water Quality Summary Statement with the following caveat:

"In summary, any open, unprotected body of water is subject to pollution from indiscriminate dumping of litter and waste products, sewer line breaks and contamination from runoff pesticides, herbicides, and waste from domestic and wildlife animals. Therefore, the use of streams for contact recreational purposes, such as swimming, wading, etc. which could cause ingestion of stream water or possible contamination of an open wound by stream water, should be avoided."

3. Health Department Volunteer Monitoring Program (Adopt-A-Stream)

This program, which is administered by the Environmental Services Section of the Health Department, was initiated in 1989 in response to the recommendation of the County's Environmental Quality Advisory Council. Its objective is to make people aware of stream pollution issues and to establish a network for reporting pollution incidents. At present, 90 groups, representing more than 500 individuals, participate in

the program. DPWES uses information from the Adopt-A-Stream program to help identify pollution sources.

4. Virginia Department of Environmental Quality (DEQ)

There are thirteen (13) sites in Fairfax County currently scheduled for inclusion in the Virginia Department of Environmental Quality monitoring: Accotink Creek, Cub Run (2 sites), Difficult Run (2 sites), Dogue Creek, Elklick Creek, Giles Run, Popes Head Creek, Pohick Creek (2 sites), Sandy Run and Sugarland Run. Failure to meet designated water quality standards may result in a stream being placed on the 303(d) list for impaired state waters.

a. Occoquan River and Basin Management

The Occoquan River lies between the southern border of Fairfax County and the northern border of Prince William County. The River has been dammed near the town of Occoquan. The Occoquan Reservoir created by the damming serves as one of two sources of drinking water for the Fairfax County Water Authority which operates a facility and withdraws water from the Reservoir. Because of its use as drinking water, water quality in the Reservoir is highly monitored and water from sewage treatment plants entering the Reservoir is highly treated.

i. Upper Occoquan Sewage Authority (UOSA)

UOSA is located in Centerville, VA. It serves the western portions of Fairfax and Prince William Counties and the Cities of Manassas and Manassas Park. The water reclamation plant includes primary-secondary treatment followed by advanced waste treatment processes: chemical clarification, two-stage carbonation, multimedia filtration, granular activated carbon adsorption, post carbon filtration, breakpoint chlorination and dechlorination. The plant's capacity is 32 million gallons per day (mgd) and is being expanded to a capacity of 54 mgd. Completion of expansion is expected by 2002/2003. UOSA operates under a Virginia Pollutant Discharge Elimination System (VPDES) Permit. The permit limits and 2001 plant performance are listed in Table I-1.

In 2001, both the plant maximum 30-day average flow and the annual average daily flows were below the design flow of 32 mgd. The maximum daily flow day during the months of March, April, May and June 2001 exceeded the plant capacity. The excess flows were diverted to the plant's equalization retention ponds and were subsequently treated during days of lower flows. UOSA produces and treats two types of residuals: biosolids from conventional treatment and lime solids from chemical treatment. Biosolids are anaerobically digested, which produces stable compounds that are conditioned with lime and

dewatered and hauled off-site to be land applied or landfilled. The lime solids are thickened and dewatered and landfilled in a permitted industrial landfill.

Table I-1. UOSA Permit Requirements and 2001 Performance

Parameter	Limit	Performance
Flow	32 mgd	24.4 mgd
Chemical oxygen demand	10.0 mg/l	9.0 mg/l
Turbidity	0.5 NTU	0.3 NTU
Total Suspended Solids	1.0 mg/l	0.3 mg/l
Total Phosphorus	0.1 mg/l	0.07 mg/l
Surfactants, mg/l	0.1 mg/l	0.026 mg/l
Total Kjeldahl Nitrogen	1.0 mg/l	0.5 mg/l
Disinfection Minimum Chlorine Residual	0.6 mg/l	1.1 mg/l
Dechlorination Chlorine Residual	Non detect	Non detect

Source: Upper Occoquan Sewage Authority

ii. Occoquan Watershed Monitoring Laboratory (OWML)

The Occoquan Watershed Monitoring Program (OWMP) is administered by the OWML and has been in operation since 1972. It is funded by the Fairfax County Water Authority and the six jurisdictions within the watershed: Fairfax, Prince William, Loudoun, and Fauquier Counties, and the Cities of Manassas and Manassas Park. The program consists of nine (9) stream monitoring stations (automated flow monitoring at all and storm sampling at most) and four (4) Occoquan Reservoir stations. Base flow samples in the streams, and all sampling in the Reservoir is done manually. In addition to surface and bottom water samples, profiles of DO, temperature and pH are also obtained at the Reservoir stations. Sampling is done weekly during the growing seasons and biweekly or monthly (if ice is present) in winter. The "health of the watershed in terms of nutrients, metals, pH, dissolved oxygen and temperature remains the same as previous years." (Occoquan Watershed Monitoring Laboratory, report from Adil Godrej, June 20, 2002.) The Lake Manassas program is used for monitoring water and sediment at seven (7) stream stations and eight (8) lake stations. The eutrophication status of the Occoquan Reservoir and Lake Manassas were within the same range as before, moderately eutrophied but holding steady.

The OWML monitors water samples quarterly for organic synthetic organic compounds (SOCs) in a program established under the recommendation of EQAC in 1982. In 1988, the OWML began monitoring sediment and fish samples within the reservoir for SOCs. The Lake Manassas program also funds monitoring of SOCs at their stations. The most frequently detected SOC is Atrazine, usually detected in springtime and early summer when it is being land applied. Concentrations "are usually lower" than the maximum contaminant level (MCL) of 3 micrograms/liter for drinking water. (Occoquan Watershed

Monitoring Laboratory, report from Adil Godrej, June 20, 2002.) The pesticide Dual (metolachor) and phthalates are regularly found in concentrations one or more order of magnitude below the MCL.

b. Noman M. Cole Jr. Pollution Control Plant (NCPCP)

The NCPCP, located in Lorton, is a 54 million gallon per day (mgd) advanced wastewater treatment facility that incorporates preliminary, primary, secondary and tertiary treatment processes to remove pollutants from wastewater generated by residences and businesses in Fairfax County. The original plant, which began operation in 1970 at a treatment capacity of 18 million gallons a day (mgd), has undergone two capacity and process upgrades to meet more stringent water quality standards. After treatment, the wastewater is discharged into Pohick Creek, a tributary of Gunston Cove and the Potomac River. The plant operates under a VPDES permit. The Plant is required to meet effluent discharge quality limits established by the Virginia Department of Environmental Quality (DEQ). The following table represents the facility's performance and current effluent monthly limitations.

Table I-2. NCPCP Permit Requirements and 2001 Performance

Parameter	Limit	Performance (12/31/01)
Flow	54 mgd	41.58 mgd
$CBOD_5$	5 mg/l	2 mg/l
Suspended Solids	6 mg/l	2.0 mg/l
Total Phosphorus	0.18 mg/l	0.10 mg/l
Chlorine Residual	Non Detect	Non Detect
Dissolved Oxygen	6.0 mg/l (minimum)	8.7 mg/l
pH	6.0-9.0 (range)	7.2-7.7
Fecal Coliform	200/100ml	3.4/100ml
Total Nitrogen	None (currently)	20.6 mg/l

Source: Department of Public Works and Environmental Services

Construction to expand the plant treatment capacity to 67 mgd began in 1997 with completion planned by the end of 2002. The includes process upgrades to remove ammonia to less than 1 mg/l and total nitrogen to less than 8 mg/l in order to meet Virginia Water Quality Standards and the Chesapeake Bay goals for total nitrogen. Also included in the project are: flow equalization tanks, new/upgraded laboratory for water quality testing, upgraded odor control systems, new instrumentation and control systems and a new septage receiving facility.

5. Special Stream Reports and Programs

a. TMDLs (Total Maximum Daily Loads)

i. Accotink Creek TMDL

Due to excessive fecal coliform counts, a 4.5 mile segment of Accotink Creek in Fairfax County, beginning at the confluence of Crook Branch and Accotink Creek to the start of Lake Accotink, was placed on the 1998 Virginia 303(d) TMDL (Total Maximum Daily Load) list. A TMDL is a highly structured watershed-specific plan for bringing an impaired body of water into compliance with the Clean Water Act goals. A two-year study began in December 1998, headed by the U.S. Geological Survey, in partnership with the Virginia Department of Conservation and Recreation, (DCR), the Virginia Department of Environmental Quality (DEQ), and Fairfax County. Study was complete in fall of 2001. The sample collection and analysis, which began in April 1999, to determine the "type" of fecal coliform found in streams is now complete. Preliminary results indicate the source of bacteria are distributed as follows; 40% waterfowl, 20% human, 13% dogs, 5.4% raccoon, 1.4% deer, and 21% other. A draft TMDL has been published by the Virginia Department of Environmental Quality and the final report was due May 1,2002. The draft TMDL includes a goal to reduce the human sources of fecal coliform by 99%. A study by USGS initiated in the summer of 2001 will identify the sources of the inputs of fecal coliform. The study will be conducted over a three-year period.

ii. Four Mile Run TMDL and the Four Mile Run Program

Although only the very upper reaches of Four Mile Run occur in Fairfax County, it is important to note the existence of a TMDL for Four Mile Run and the participation of Fairfax County in the Four Mile Run Program.

The Four Mile Run Program is the oldest continually active program of the Northern Virginia Regional Commission (NVRC). The four jurisdictions (Arlington County, Fairfax County, the City of Falls Church and City of Alexandria) through which Four Mile Run flows are involved in the program. The program was founded in 1977 to ensure that future development would not result in increased flooding in the watershed. Today all development and redevelopment is analyzed through the Four Mile Run Computer Model to determine whether on-site detention of stormwater is necessary to prevent downstream flooding. In 1998, the Four Mile Run Agreement was amended to address urban water quality issues in addition to flooding.

The Four Mile Run Fecal Coliform Study to determine the sources of fecal coliform in the watershed using DNA was completed in 2000. The study found

that waterfowl contribute over one-third (31%) of that bacteria that could be matched, 18% from humans, 13% from dogs, 6% from deer, 19% from raccoons and 13% from other sources.. Bacteria from humans appear to be highly localized. There were indications in that without regard to specific host animals, E. coli bacteria seem to regrow, through cloning, within the storm drains and stream sediments, which in turn perpetuates bacteria levels. Efforts are underway to study this hypothesis,

NVRC was given a grant from the Virginia Department of Environmental Quality (DEQ) and the development of a TMDL (Total Maximum Daily Load) for bacteria in Four Mile Run by May 2002. A TMDL is a highly structured watershed-specific plan for bringing an impaired body of water into compliance with the Clean Water Act goals. The implementation plan will be developed within two years of the EPA acceptance of the proposed TMDL plan**.**

iii. Bull Run TMDL

NVRC has been approached by the Virginia Department of Environmental Quality concerning the development of TMDLs for impaired streams in the Occoquan watershed. The first two will be for streams outside Fairfax County, Licking Run and Cedar Run. However a TMDL for degradation of the streams benthic community is scheduled to be completed for Bull Run in Fairfax by 2008.

b. Optical Brightener Monitoring (OBM) Program

NVRC conducted optical brightener monitoring for the third year in Four Mile Run watershed during the summer of 2001. OBM is a quick and inexpensive way of uncovering certain types of cross-connections between sanitary sewer lines and streams. It detects the presence or absence of a common dye often found in laundry detergents and therefor often in sewage. Several potential cross-connections were discovered and referred to the appropriate agencies for action, including one in Fairfax County.

c. Kingstowne Stream Restoration Project

In 1998, Fairfax County, the Northern Virginia Soil and Water Conservation District, the U.S. Natural Resources Conservation Service, and two citizens groups- The Friends of Huntley Meadows and the Citizens Alliance to Save Huntley- formed a partnership to restore the Kingstowne stream**.** The Kingstowne stream is a tributary of Dogue Creek and is upstream of Huntley Meadows Park. Started in October and finished by December 1999, the Kingstowne Stream Restoration Project is now functional. The project used principles of geomorphology and soil bioengineering to create gentle meanders that slow the velocity of flow and natural vegetation to stabilize the stream banks. Testing has substantiated that erosion has been brought under control and water quality downstream is improved. Between

January and December 2001, 21 storm event samples and 12 base flow samples were collected and analyzed to determine pollutant loads in Dogue Creek, Based on the monitoring data, the 85% sediment removal efficiency was achieved for all storm events. Therefore no stop work orders were issued to the developer during 2001.

d. Gunston Cove Aquatic Monitoring Program

Gunston Cove is the site of the outfall of the Fairfax County Noman M. Cole sewage treatment facility. The primary objective of this George Mason University program is to determine the status of the ecological communities and physical-chemical environment in the Gunston Cove area of the tidal Potomac for evaluation of long-term trends. This should provide the basis for well-grounded management strategies to improve water quality and biotic resources in the tidal Potomac. It was recommended in the 2001 report that long term monitoring should continue.

Water quality has generally improved since the 1980s but is showing a decline from peak values around 1995. Algae are at lower levels than in the mid 80s and zooplankton (microscopic "animals' found in surface waters) have increased. In the cove white perch has remained dominant at steady levels over the period. Brown bullhead has declined since 1984 and blueback herring and alewife have declined since 1990. Spottail shiner and pumpkinseed numbers have shown a slight increase. In the river, the catch levels were slightly less than in the cove.

D. PONDS AND LAKES

All ponds and lakes in Fairfax County are man-made by excavation and/or the damming of streams. These open water impoundments have their own aquatic communities and have many of the same organisms as streams. Most provide recreational opportunities for humans. Due to increased runoff in more urbanized areas, they are often subject to heavy sediment and nutrient loads. Heavy sedimentation means that most of the lakes have to be dredged on a regular basis in order to maintain pond or lake depth. Heavy nutrient loads result in large algal and plant blooms over the warmer months of the year.

Reston has several large lakes (Lake Newport, Lake Anne, Lake Thoreau, and Lake Audubon) which are managed by the Reston Association and have been monitored for algae growth and sedimentation since 1981. The invasive weed hydrilla has become a severe problem in Lakes Audubon and Newport and management initiatives have been initiated. Also, waterfowl management initiatives have begun in an effort to curb the large Canada Goose population on the Reston lakes.

1. Monitoring and Results

The lakes are monitored for Dissolved Oxygen, temperature, pH total phosphorus, clarity, chlorophyll (the green pigment found in algae), and the presence of plankton

(small unicellular organisms found in the upper surfaces of waters.). The 2001 monitoring was conducted by Aquatic Environment Consultants. Rainfall in May of 2001 was over five inches and may have contributed to high phosphorus loads which, in turn, increased the algal blooms on some of the lakes during the summer. Most of these lakes have large surface algae populations and therefore lower water clarity during summer and early fall. This classifies them as eutrophic, a term which comes from the Greek for "well nourished" and is most probably an indicator of the high nutrient, most specifically phosphorus, levels in the lakes.

a. Lake Anne

Dissolved Oxygen levels were improved over previous years. The aeration system remained functional throughout the summer and is credited with the DO improvement. The temperature profile of Lake Anne was not as affected by ambient temperatures as it has been in the past. The average lake temperature for 2001 was 23.1 ^{o}C, which is 4.1 ^{o}C above the long term average of 19.0 ^{o}C. The whole-lake pH levels were above the long-term mean. Blooms of green and blue-green algae occurred throughout the season. Reduced water clarity resulted. The largest green algal bloom ever sampled occurred in July. This resulted in high biomass (evidence of unicellular organisms present in the water) readings throughout the summer.

b. Lake Audubon

The temperature/dissolved oxygen profile for Lake Audubon showed stratification after April. (Different "layers" of water had different DO and temperature readings). Water temperatures were similar to long-term averages. The pH levels were all above the long-term averages. The yellow–brown algae dominated the cooler waters in April and dropped in numbers to be replaced by blue-green algae and other algae as water temperature rose. There was a blue-green algae bloom in July. Biomass peaked in August, higher than the low values of 1999.

c. Lake Thoreau

Dissolved oxygen levels in certain "layers" of the lake decreased during summer months but overall the DO levels were up in 2001. The numbers of algae present were the lowest of any of the lakes in Reston. Blue-green algae and green algae were most prevalent from July to September. Overall algal presence was high and biomass was the second highest ever reported.

d. Lake Newport

Water temperatures were similar to the long-term averages. Thermal stratification was present throughout the season. This lake had the highest oxygen depletion of any of the lakes but it was not as severe as other years. Algal density was the highest on record. Blue-green and green algae were the most abundant types.

There was a extremely large blue-green algae bloom in July. The populations of all algal groups, especially the blue-greens contributed in 2001 to the highest density and second highest biomass since 1992. Seasonal density was over three times the long term averages and biomass was over twice the respective average.

e. Pohick Watershed Lakes

The six Pohick watershed lakes (Barton, Braddock, Huntsman, Mercer, Royal and Woodglen) are inspected annually for dam structure but are not monitored for biological or chemical parameters.

f. Lake Barcroft

The Lake Barcroft Watershed Improvement District (WID) is a local taxing district authorized by Virginia Law for conservation purposes. In 1999, Lake Barcroft had about 15,000 cubic yards of dredge spoil from the lake to dispose of. In order to avoid the costs associated with hauling it to a landfill, they rented a huge topsoil screening machine and excavator to load it, converting the waste material into topsoil by filtering out all the sticks, stones, beverage cans and other debris. The topsoil was then made available to local residents for a modest delivery fee. Some innovative BMPs (Best Management Practices), such as flow regulators, check dams, a diversion debris trap, a stormwater injection pit and street sweeping program have been implemented by the WID. These BMPs are being studied for both their capacity to reduce pollution and improving water quality in the lake and its tributaries, possibly leading to Countywide implementation. The WID also has a program to purchase and distribute high quality lawn fertilizer in 50-pound bags, which has been formulated without phosphorus and sell it to homeowners.

g. Lake Accotink

Lake Accotink is owned and managed by the Fairfax County Park Authority. County government has authorized the expenditure of $6,000,000 to dredge and remove 200,000 cubic yards of sediment from the lake. The Fairfax County Park Authority provides a boat and operator to the Fairfax County Health Department, which conducts water quality tests from four surface points from May through August. Results from the sampling were within the required limits as mentioned in the Health Department Stream Report.

h. Other ponds and lakes

There are other significantly sized lakes within the County. Many are centered within developments and have dwellings built along the banks of the lakes. There are numerous smaller ponds throughout the County that are found within communities, commercial developments or on farm properties.. Some are associated with golf courses and many serve as stormwater management ponds.

E. STORMWATER MANAGEMENT

1. Status of Stormwater Utility (Environmental Stormwater Utility) Concept in Fairfax County

In December of 1998, a draft report by the Stormwater Utility Advisory Group (SUAG) to the Board of Supervisors was circulated for review. The report addressed several issues relating to the implementation of a stormwater service charge program for Fairfax County. Activities were suspended leading up to the fall 1999 Board of Supervisors elections. DPWES is evaluating the need to conduct a more comprehensive public information campaign to articulate need and gain wider public support. During the summer of 1999, the firm of Camp, Dresser and McKee (CDM) was requested to develop a concept paper/report on framing significant aspects of the County's existing stormwater control program and present ideas and recommendations on the essential elements of future stormwater program. CDM submitted a draft report in December of 1999. A final edition was completed by March 2000. Work on public outreach is proceeding but any further action awaits full funding and the implementation of the stormwater utility fee program by the County.

2. Status of NPDES Requirements

The National Pollutant Discharge Elimination System (NPDES) Municipal Separate Stormwater Permit (MS4), a five year permit, was reissued by the Virginia Department of Environmental Quality (DEQ) in January 2002. Total Maximum Daily Loads (TMDLs) are tied into the new permit. The Stormwater and Planning Division and the Maintenance and Stormwater Management Division incorporated into the new permit a more comprehensive stormwater management program. This program includes the comprehensive Watershed Management Planning effort and long term biological monitoring, infrastructure mapping, inspections and maintenance, retrofitting developed areas with water quality control facilities and a more rigorous public outreach and education. The Maintenance and Stormwater Management Division of DPWES will perform inspection of privately owned stormwater management facilities on a regular basis (every five years). Water quality will be monitored at six storm sewer outfalls four times a year (seasonally), and 100 outfalls per year will be monitored during dry weather to determine the presence of illicit discharges.

During 2001, the County continued to evaluate BMPs (best management practices), undertook several stream restoration projects, continued with the monitoring of the six wet weather and 101 dry weather outfalls, and inspected 1,224 stormwater control facilities.

In March 2001, the 2000 Annual MS4 (Municipal Separate Storm Sewer System) Report was submitted and accepted by the Virginia Department of Environmental Quality.

3. Regional Stormwater Management Program

a. Background

Since the early 1980s, the County's *Public Facilities Manual* (PFM) has included a provision that encourages the concept of regional stormwater management. As opportunities arose, major developers as well as County staff pursued regional stormwater management primarily through the development process. An overall plan identifying the most appropriate locations for regional facilities was needed to improve this process.

In January 1989, the Board of Supervisors adopted a plan prepared by the engineering firm of Camp, Dresser and McKee. The plan, intended to be a pilot program, consists of a network of 134 detention facilities that will directly control 35 square miles of drainage area. To date, over 46 regional ponds in the Regional Stormwater Management Plan have been constructed. Currently there are 28 facilities in various stages of implementation. Eighteen potential facilities are in the final design phase either as County managed projects or via developers through rezoning. Five regional pond facilities are currently in the bonding or construction phase.

This Stormwater Management Plan is currently being re-evaluated by an ad hoc committee within the Department of Public Works and Environmental Services and it is expected that recommendations concerning the program will be made in late 2002.

b. Creation of new Stormwater Planning Division (SWPD)

Created in February 2000 by the Director of DPWES after approval by the Board of Supervisors, this new division is to review current countywide policies affecting the ecosystem and stormwater management issues. The mission of the SWPD is to promote policies to improve and protect the quality of life and support the environmental goals of the County.

c. Changes in County Mowing Policy at Stormwater Management Ponds

During the summer of 2000, in support of the interim tree policy adopted by the Board of Supervisors in 1999, the county revised the pond-mowing program. The interim tree policy provides opportunities for planting trees beyond the areas currently allowed under the Public Facilities Manual. The mowing program reduces the area mowed in and around a stormwater management pond by an average of 60% per pond. This program has resulted in the planting of 30 ponds, with additional 10-15 pond plantings slated for 2002.

4. Other Stormwater Ponds in Fairfax County

Fairfax County has various types of stormwater treatment facilities. Dry ponds fill up with water during a storm but return to a "dry" state within a few hours or a few days depending on its functional requirements. Of the total 1,279 dry ponds in the County, 893 are maintained by Fairfax County and 386 are privately maintained. Wet ponds have a permanent pool of water. Of the total 329 wet ponds in the County, 16 are maintained by the County and 313 are privately maintained. A total of 325 sites were inspected during 2001.

5. Infill and Residential Development Study

The combination of development patterns in the County and a growing concern over water quality issues led to the May 1999 request from the Board of Supervisors for the "Infill and Residential Development Study". The study was completed in 2000 and released to the public. The Board of Supervisors accepted the final recommendations at a public hearing January 22, 2001. The Study staff have reviewed the effectiveness of current policies regarding erosion control and storm drainage with the dual goal of minimizing any impacts of stormwater runoff from a proposed development on downstream property and limiting the impacts of stormwater management facilities on a neighborhood. Recommendations include:

1) Enhanced erosion and sediment control program, including the revoking of land disturbing permits during egregious violations.
2) Allow the use of chemical erosion prevention products, and bonded fiber matrix on highly sensitive soils or on steep slopes
3) Adoption of innovative BMPs,
4) Amend the Public Facility Manual to include Super Silt Fence requirements, Storm Drain Inlet Protection Devices, Faircloth Skimmers
5) Improved requirements for early review of stormwater management facilities as part of the rezoning process
6) Improved requirements for evaluating the adequacy of stream channels for increased runoff due to new developments
7). Development of a BMP monitoring program
8). Enhance education programs for citizens, staff and industry regarding E&S control.

Actions to date to fulfill the recommendations include:

1) Issuance of a letter to industry on October 10, 2001 that provided guidelines for designs of bioretention facilities and requirements for innovative BMP practices.
2) A pilot program for retrofitting stormwater detention ponds in older areas was initiated on July 1, 2002
3) Study concerning the impact of extended detention of the 1 year storm was started in January, 2002.

F. NONPOINT SOURCE POLLUTION PROGRAMS

1. Chesapeake Bay Program and Agreements

The Chesapeake Bay Program (CBP) is a cooperative arrangement among three states (Virginia, Pennsylvania, and Maryland), the District of Columbia, and the Federal government (represented by the Environmental Protection Agency) for addressing the protection and restoration of the water quality, habitats, and living resources of the Chesapeake Bay and its tributaries. These commitments are not legally binding. Each state determines how it will meet the various commitments and the approaches to implementation often vary greatly among states. All streams in Fairfax County are tributaries of the Potomac River, which flows into the Chesapeake Bay. Three Chesapeake Bay Agreements have been signed, focusing on reducing pollutants in the Bay and its tributaries.

2. The Virginia Chesapeake Bay Preservation Act and Regulations

The Virginia Chesapeake Bay Preservation Act was passes as part of Virginia's commitment to the second Chesapeake Bay Agreement goals to reduce non-point source phosphorus and nitrogen entering the Bay. Pursuant to the requirements of the Chesapeake Bay Preservation Act and Regulations, the Chesapeake Bay Local Assistance Department (CBLAD) and the Chesapeake Bay Local Assistance Board (CBLAB) have reviewed Fairfax County's Comprehensive Plan for consistency with the Act and Regulations.

On March 19, 2001 the Chesapeake Bay Local Assistance Board determined that Fairfax County's Phase II program is consistent, with conditions, with the Chesapeake Bay Preservation Act and Regulations. The County has until December 31, 2003 to address the four consistency recommendations: 1) map of the County's Chesapeake Bay Preservation Area components, 2) a shoreline erosion inventory and implementation strategies for use by the Wetlands Board in approving shoreline erosion structures, 3) inventory and development of plan for public waterfront access, and 4) develop policies that address the recommendations for water quality as discussed in the "Infill and Residential Development Study".

The agricultural portion of the Chesapeake Bay Preservation Ordinance requires landowners with land in agricultural uses to have conservation plans. The Northern Virginia Soil and Water Conservation District (NVSWCD) prepares soil and water quality conservation plans and provides technical assistance in the implementation of approved plans. NVSWCD has written plans for all Agricultural and Forestal Districts that have Resource Protection Areas within their limits. Currently, NVSWCD is working extensively with horse owners and keepers, since a large percentage of agricultural land use in Fairfax County is related to horse operations. These operations

require innovative land management and careful nutrient management to prevent and reduce pollution in runoff to nearby streams. In 2001, 33 soil and water quality conservation plans were developed for 465 acres and included 10,805 linear feet of vegetated buffers in RPAs. Cumulatively, 8,594 acres and 223,813 linear feet of RPAs are covered by conservation plans developed since 1994 when the program began. County regulations require conservation plans for establishing and renewing Agricultural and Forestal Districts. There are approximately 40 such districts in the County. NVSWCD also develops conservation plans for landowners receiving state cost-share money for installing agricultural BMPs, such as manure storage and composting structures or fencing animals out of streams. NVSWCD continues to distribute a brochure it developed for Fairfax County horse-keepers: *Agricultural Best Management Practices for Horse Operations in Suburban Communities*.

3. Erosion and Sedimentation Control and Enforcement-Fairfax County Department of Public Works and Environmental Services

DPWES is planning the implementation of organizational improvements to the Environmental and Facilities Inspection Division (EFID, formerly the Site Inspection Branch) that will result in a greater emphasis and a higher quality of inspection services associated with erosion and sediment control. They will be developing a new quality assurance program and will be training Field Specialists (a newly established position). Field Specialists will be responsible for resolving all erosion and sediment control violations. DPWES will be developing a prioritized inspection program, in accordance with guidelines established by the Virginia Department of Conservation and Recreation, that will consider slope, soil type, proximity to streams, and extents of buffer areas to determine an overall rating for any given site. These proposed resource requirements and organizational improvements are being led by the County's Environmental Coordinator.

a. Inspections

In 2001, the EFID recorded an average of 1,055 Erosion and Sediment (E&S) control inspections per month. They also issued 30.83 Notice of Violations per month for violations of Chapter 104 of the *Fairfax County Code*.

b. Lake Martin

Litigation against two of the upstream developers for off-site damages associated with land development activities has commenced and trial dates have been scheduled. In addition the County has engaged the services of a consultant to prepare a plan to remove 6100 cubic yards of sediment from Lake Martin. Additionally plans to retrofit two upstream existing stormwater management ponds to protect stream channels that drain into Lake Martin have been drafted.

4. Occoquan Basin Nonpoint Pollution Management Program

The Northern Virginia Regional Commission continued in its role as staff to the Occoquan Basin Nonpoint Pollution Management Program. The program was established in 1982 to provide an institutional framework for maintaining acceptable levels of water quality in the Occoquan Reservoir, one of the two major sources for of drinking water for much of Northern Virginia. With the release of the 2000 Census data, staff determined that were approximately 363,000 people residing in the Occoquan watershed as of the year 2000. This represents a four-fold increase in population from when statistics were first collected in 1977. The Occoquan Program has initiated an update to its 1992 Northern Virginia BMP (Best Management Practice Handbook). The main emphasis will be on the inclusion of previously innovative, but now accepted techniques such as rain gardens and some non-structural BMP techniques with demonstrated removal efficiencies.

a. Modeling

In October 2001, the Occoquan Policy Board and Technical Advisory Committee approved a fundamental change in the management structure for the Occoquan Model. A standing Modeling Subcommittee has been created to oversee the model development which will be handled by Occoquan Watershed Monitoring Laboratory. The result will be a state-of-art model that will be able to take quick advantage of advances in modeling technology.

b. Storm Drain Marker Program

NVRC, along with the four local governments that share the watershed, have launched a program designed to place more than 1,100 colorful durable vinyl markers on storm drains. These markers will alert citizens of the potential harm from dumping. Also NVRC has developed door hangers, in English and Spanish, informing citizens of the program and providing telephone numbers.

5. Soil and Water Conservation Technical Assistance

In calendar year 2001, the Northern Virginia Soil and Water Conservation District (NVSWCD):

- Reviewed and commented to DPWES on the erosion and sediment controls, water quality protection, and stormwater management aspects of 61 site development plans in the Pohick Creek Watershed and within three miles of the Potomac River. NVSWCD also reviews DPWES, Fairfax County Park Authority (FCPA), School Board projects and any other plans, as requested, which appear to have particular difficulties involving soil types and slopes.
- Reviewed and commented to the Department of Planning and Zoning (DPZ) on 219 rezoning and special exception applications, with particular attention to the properties of soils, the potential for erosion, the impact on drainage, stormwater management, and the surrounding land uses and environment.

- Provided information about soils to 179 consultants, engineers, developers, and realtors, and citizens.
- Provided land management assistance to individual homeowners and homeowner associations via 469 phone calls, email or office visits, and 98 site visits. Solutions were recommended for drainage, erosion, and other natural resource problems.
- Provided technical advice to 57 pond owners.
- Provided design and installation expertise for two stream stabilization projects. One, below Lake Accotink, was done in partnership with DPWES, FCPA, and the Virginia Department of Forestry (VDOF) and in conjunction with a three-day workshop which also included a day of stream measurements. The other, on Wolf Trap Run, was done in partnership with DPWES, VDOF, and the local community.
- Designed three SWM pond retrofits for DPWES in order to provide extended detention, greater water quality improvement, and a more aesthetically pleasing and ecologically balanced environment.

a. Workshops

NVSWCD and VDOF held an intensive three-day workshop in the fall of 2001 on stream stabilization, stream classification, measurement and restoration. There were 40 participants from various local and state agencies.

In September 2001, DPZ, DPWES, and NVSWCD, in conjunction with the Center for Watershed Protection, sponsored a workshop for 95 staff on watershed management for suburban watersheds. Topics included better site design techniques, innovative stormwater management measures, stream protection, and watershed planning.

b. Backyard to Bay Program

NVSWCD created and distributes the *Citizens Water Quality Handbook*, a practical guide to water quality, that contains chapters on watersheds, water conservation, nonpoint source pollution, stream management, wetlands protection, water quality monitoring, environmentally friendly lawn care, specific suggestions for "making a difference," and a listing of agencies and organizations that provide services, information, and help related to water quality. *Don't Dump Oil*, a Spanish language brochure, explains that dumping used oil into storm drains is not only illegal, but can harm people and the environment.

c. Publication of "*Maintaining BMP's- A Guidebook for Private Owners and Operators in Northern Virginia*

Published in February, 2000 by the Northern Virginia Regional Commission, the guidebook specifically targets homeowners/civic associations and small businesses that may have responsibility for BMP maintenance. The guidebook addresses

simple maintenance tasks, how to plan for long-term BMP maintenance costs, and where to go for additional information.

6. Stream Valley Reforestation

In 2001, the Virginia Department of Forestry partnered with volunteers from various organizations such as the Chesapeake Bay Foundation, Difficult Run Conservancy, the Potomac Conservancy, 4-H Clubs, and Nextel Corporation to plant 1,700 seedlings in riparian zones located in stream valleys throughout Fairfax County.

7. Stream Bank and Other Stabilization Projects

a. Wolf Trap Run and Accotink Watershed

Two stream bank stabilization projects are being sponsored by Fairfax County Department of Public Works Stormwater Management Division, the Northern Virginia Soil and Water Conservation District, and the Virginia Department of Forestry. In February 2001, NVSWCD and DPWES jointly designed and implemented a 150 foot segment of Wolftrap Run at Cinnamon Creek. The purposes of the projects are the protection of infrastructure (trails) and sediment reduction.

b. Old Farm Pond at Mason District Park Reconstruction and Turkeycock Run Project

The Fairfax County Park Authority initiated reconstruction of an old farm pond at Mason District Park, which will replace the existing dam, install new structures, install an overlook at the pool edge and create a wetland area with boardwalk access. Stream reaches of Turkeycock Run below the pond have been adversely affected and the increase in pool surface will create stormwater runoff protection for those stream segments.

FCPA is also planning a restoration of Turkeycock Run that will begin in 2003 as the Mason District Pond restoration is completed.

c. Hidden Pond Park Stream Retrofit

The Fairfax County Park Authority will add BMP (Best Management Practice) controls to an existing facility upstream of the park to protect the portions of the stream above the pond, allow for restoration of stream health, and reduce sedimentation in the pond.

d. Huntley Meadows Park - Dogue Creek and Barnyard Run

The Fairfax County Park Authority and the Department of Public Works and Environmental Services are working on a bond project that would protect the stream reaches of Barnyard Run and Dogue Creek above Huntley Meadows Park.

8. Septic Permitting and Repairs

Improperly built and maintained septic systems can often be a source of pollution to surface and ground waters. Approximately 30,000 homes and business are served by septic tank systems in Fairfax County. There were 412 new septic systems constructed in 2001. There were 899 Septic Tank Repair Permits issued in 2001. Repairs ranged from total replacement of the system to minor repairs such as broken piping. There were 824 Septic Repair Permit Approvals in 2001. Areas of marginal or highly variable soil remain a concern for future failing septic systems. Fairfax County currently has no enforced septic system inspection requirements.

G. WATER POLLUTION ENFORCEMENT ACTIONS

1. Virginia Department of Environmental Quality (DEQ)

DEQ reports that it had 68 Underground Storage Tank cases and 236 Pollution Response cases in Fairfax County in 2000. We have no summary data for 2001.

H. PERENNIAL STREAM MAPPING PROJECT

A project to field identify perennial streams was initiated in early 2002 in response to Fairfax County Board of Supervisors' direction. This action was taken, at least in part, as a result of an Environmental Quality Advisory Council (EQAC) resolution relating to the mapping and protection of additional stream segments under the County's Chesapeake Bay Preservation Ordinance. Funding was approved on September 10, 2001. During the fall of 2001, staff developed a draft protocol for field identifying the boundaries between intermittent and perennial streams. Fieldwork is expected to be completed by December 2003.

I. WATERHED PLANNING AND MANAGEMENT

1. Countywide Watershed Planning

The Fairfax County Department of Public Works Stormwater Planning Division of DPWES has commenced a 5 to 7 year watershed planning program to develop new management plans for all 30 County watersheds. The current master drainage plans

were developed for the County in the mid 1970's. Consultants have been selected for the stream physical assessment tasks for the development of the watershed managements plans. The first phase of the watershed planning effort, which covers 60% of the County, consists of the watersheds identified in Table I-3.

Table I-3

Watersheds Included in the First Phase of the Watershed Master Planning Initiative

Project Sequence	Watershed	Size (square miles)
1	Little Hunting Creek	11
2	Cub Run	42
3	Cameron Run	33
4	Horsepen Creek	10
5	Difficult Run	58
6	Popes Head Creek	19
7	Nichol Run	8
8	Pond Branch	8
9	Pohick Creek	36
10	Sugarland Run	14
	Total	239

Source: Department of Public Works and Environmental Services

Upon completion of the first phase, the remaining watersheds will be evaluated to determine a sequence for the rest of the County. The first Stakeholder and Public Involvement Meeting was held October 3, 2001. A review of the Watershed Planning Process was presented with time for citizen input and group discussions at the end. Those comments were considered as the County began its Watershed Planning.

2. Reston Watershed Plan

The Reston Association Board of Directors authorized the development of a Watershed Management Plan and establishment of a stakeholders group (the Reston Association Watershed Action Group, or ResWAG). Work on the project was initiated in 2001 and will be completed mid-2002. Work is being done by the environmental firm GKY and Associates.

3. Northern Virginia Regional Commission Occoquan Program Watershed Planning

Recognizing the significance of the Occoquan Reservoir as source of drinking water, the Occoquan Policy Board and Technical Advisory Committee have approved the development of a watershed-wide management plan. The intent is not to duplicate efforts already taking place in local jurisdictions but to coordinate and strengthen existing components and to fill in gaps where appropriate. This is anticipated to be a two year effort and will involve Fairfax County.

J. GROUNDWATER ASSESSMENT

The United States Geological Survey (USGS) maintains a series of wells throughout the nation to monitor groundwater levels and drought. Two are located in Virginia ; one such well (Site 385638077220101) in Fairfax County has been maintained since 1976. This well provides continuous real-time data that is used by the USGS to assess ground water levels. You can find the information on this well by going to http://groundwaterwatch.usgs.gov.

Neither the Fairfax County government nor the Virginia Department of Environmental Quality monitors groundwater for water quality or water levels in Fairfax County.

K. DRINKING WATER SUPPLY

The County's water supply comes from the Potomac River, the Occoquan Reservoir, Goose Creek, community wells, and private wells. The Fairfax County Water Authority (FCWA) also provides drinking water to the Prince William County Service Authority, Loudoun County Sanitation Authority, Virginia America Water Company (City of Alexandria and Dale City), Town of Herndon, Fort Belvoir, Dulles Airport, and Lorton Correctional Institution.

With the exception of some wells, prior to use the water must be treated. The County's water use increased to 49.55 billion gallons in 2000. Table I-4 presents the 2001 sources of the County's water supply.

Table I-4
Sources of Fairfax County's Water Supply, 2001

Sources	Gallons (in billions)
Occoquan Reservoir (Lorton/Occoquan)	21.60
Potomac (Corbalis)	27.86
Wells	0.03
Purchased	0.06
TOTAL	49.55

Source: Fairfax County Water Authority

1. Wells

a. Fairfax County Water Authority and Public Wells

In 2001, the five (5) FCWA wells and their two (2) distribution systems were monitored monthly for bacteriological quality and annually for Volatile Organic Compounds (VOCs). In addition, the wells were tested semiannually for metals, nutrients, solids, odors, color, pH, alkalinity, and turbidity. During 2001, Three of the six wells exceeded the Secondary Maximum Contaminant Level (SMCL) for odor and two for iron. These are non-enforceable limits relating to the aesthetic quality of drinking water.

During quarterly monitoring in 2001, four (4) wells showed trace levels of VOCs. The monitoring results on wells met the Virginia Department of Health Water Works Regulations.

Lead and Copper monitoring in accordance with EPA and VDH Waterworks Regulation was performed on both distribution systems in 2001. The system met all EPA Lead and Copper regulatory requirements.

b. Private Wells

There are approximately 12,000 single-family residences that are served by individual well water supplies in Fairfax County. In 2001, 226 New Well Permits were issued for single family residences and 75 for non-community well water supplies. There were 261 Well Abandonments (wells closed) in 2001.

2. Lorton and Corbalis Systems Monitoring Results and Reports

a. Trihalomethanes, Chloramines, and other By-products of Water Treatment

Trihalomethanes are by-products of chlorination water treatment and are thought to be carcinogenic**.**

b. Trihalomethanes (THM) Monitoring Project

The 2001 distribution system running quarterly averages were below the Maximum Contaminant Levels (MCL) for total trihalomethanes (TTHM) of 100 µg/l. The 2001 running quarterly averages for TTHMs were 23 µg/l and 44 µg/l for the Corbalis and Lorton distribution systems, respectively.

c. Disinfectant/Disinfection By-products (D/DB-P) Rule

EPA has promulgated Stage 1 of the D/DB-P Rule, which lowers the total THM MCL from 100 µg/l to 80 µg/l. This rule took effect in January of 2002 (TTHM - Total Haloacetic Acids, Bromate, and Chlorite and the Disinfectants, Chlorine,

Chloramine, and Chlorine Dioxide). In addition, the disinfection by-product Haloacetic Acid (HAA) will be regulated a level of 60 µg/l. Preliminary testing indicates that FCWA will be able to meet these guidelines. The rule also sets a Maximum Residual Disinfectant Level (MRDL) for chlorine of 4 µg/l**.** FCWA is presently testing for these chemicals in the water treatment systems. To obtain lower TTHM (total THM) concentrations, the new facilities for ozonation are being constructed at the Corbalis and Lorton facility.

Stage 2 (Long Term) is scheduled by EPA to be finalized by July 2003 and will regulate THMs and HAAs based on locational running average, monitoring and compliance requirements, and enhanced coagulation.

d. Heavy Metals

FCWA tests drinking water quarterly for Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Copper, Lead, Magnesium, Mercury, Nickel, Potassium, Selenium, Silver, Thallium and Zinc and on a monthly basis for Iron, Manganese and Sodium. The levels of these metals continue to be below their MCL or SMCL. FCWA has reported that "the concentration levels for the unregulated metals were within an expected range."

e. Enhanced Surface Water Treatment Rule (ESWTR)

The ESWTR assumes revisions to the current Surface Water Treatment Rule may be necessary to provide additional protection from pathogenic organisms. The fist step toward developing the ESWTR was the microbiological monitoring required under the Information Collection Rule. The first year of the data has been used to develop requirements for the interim ESWTR. The long-term ESWTR will be based on additional data collection and refinement. The proposed ESWTR will provide for a sanitary survey of the entire system, a maximum contaminant level goal for cryptosporidium of zero, and treatment requirement alternatives.

f. Other Monitoring Programs

FCWA monitored 3,307 distribution taps for total coliform in 2001. Each months compliance report was within the regulatory limits for the Virginia Department of Health and the EPA's Total Coliform Rule.

During 2001, the FCWA Laboratory monitored the surface waters and finished drinking water for 42 Volatile Organic Compounds (VOC) and 39 Synthetic Organic Compounds (SOC). No VOCs were detected in source waters except for trace amounts of MTBE (Methyl tertiary butyl ether). In some parts of the U.S., MTBE has been detectable in high amounts in source waters. In 2001, monitoring of the FCWA well systems has resulted in non-detectable levels, and surface system monitoring has shown only trace amounts in the raw and unfinished waters. The only VOCs detected in the finished water systems were TTHMs and trace amounts

of MTBE**.** The few SOCs that were detected were detected in both the finished and source waters and were at trace levels significantly below the Maximum Contaminant Loads (MCLs)

g. Residuals Disposal

Residuals occur as the result of heavy sediment loads entering the freshwater intakes and having to be removed from the water prior to treatment. Residuals generated at Corbalis are presently being applied by contract to agricultural lands in Maryland and Virginia. The FCWA is studying the possible use of polymers in lieu of lime in the dewatering process. If polymer condition dewatering becomes feasible, the solids volume for disposal may decrease.

h. Consumer Confidence Reports

Federal regulations require water suppliers to provide annual reports on the quality of the drinking water to their customers through the Consumer Confidence Report (CCR) Rule. FCWA customers received their first annual CCR in the summer of 1999. The 2001 CCR is available for review on the FCWA website at **http://www.fcwa.org.**

3. Source Water Assessments

The 1996 Amendments to the Safe Drinking Water Act (SDWA) provided for source water assessment and protection programs designed to build a prevention barrier to drinking water contamination. Under SDWA, states are required to develop comprehensive Source Water Assessment Programs that identify the areas which supply public tap water, inventory contaminants, and assess water system susceptibility to contamination. FCWA, through a grant from the Virginia Department of Health, has completed an inventory of potential sources of contamination and a survey of land use activities within the Potomac and Occoquan Watersheds. The Virginia Department of Health is currently reviewing the complete Source Water Assessment and is expected, based on information provided through the grant study, to make a determination of susceptibility to contamination in 2002.

4. Facilities Management

a. New Treatment Plant in Lorton

FCWA is building a new state-of–the–art 129 mgd (million gallons per day) water treatment plants, expandable to 160-mgd; to replace the existing Lorton and Occoquan treatment plants in Lorton. In addition to flocculation and sedimentation, the Griffith Water Treatment Plant will include advanced treatment

processes of ozone disinfection and biologically active, deep bed, GAC (granular activated carbon) filtration. Construction of the plant began in the Spring of 2000 and was approximately 47% completed as of April, 2002. The plant is scheduled for completion in January, 2004. The Raw Water Pumping Station associated with the new plant will also have a capacity of 120 mgd and be expandable to 160 mgd**.** The raw water facilities project is approximately 80% complete and is scheduled for completion in January 2004.

5. Regional Cooperative Water Supply Agreements

In order to protect the ecosystem of the Potomac River during low flow periods, the three major water utilities in the Metropolitan Washington area have signed water allocation agreements for water use during these low flow periods. Two upstream dams, Jennings-Randolph on the Potomac River and the Savage River Dam, along with Seneca Lake in Montgomery County, Maryland, are storage facilities for drinking water supplies during low flow periods. While the Potomac River has flows that average above 7,000 million gallons a day, the river has often reached flows well below that, usually in late summer and early fall. The lowest recorded flow in this region was 388 mgd at Little Falls in September during the drought of 1966. In 1981, the three major metropolitan water utilities, including the Fairfax County Water Authority, signed the Low Flow Agreement, which requires that there be a minimum flow of 100 million gallons a day in the Potomac.

a. Interstate Commission on the Potomac River Basin (ICPRB) Cooperative Water Supply Operations (CO-OP)

The ICPRB plays several important roles in providing for the region's current and future water supply needs. The CO-OP Section facilitates the agreement among the three major water utilities (Fairfax County Water Authority is one) that require water suppliers to share resources during times of low flows in the Potomac River. The Water Resources Section also provides technical water resources management assistance to the jurisdictions throughout the basin. There were no releases of water from any storage facilities for drinking water purposes in 2001. The lowest flow for 2001 for the Potomac River at Little Falls was 530 mgd on November 9.

b. Metropolitan Washington Area Council of Governments (COG) Water Supply and Drought Awareness Plan.

In response to the droughts of 1998 and 1999, COG brought together a task force in May 2000 to coordinate regional responses during droughts to reduced availability of drinking water supplies. The plan consists of two components (1) a year round plan emphasizing wise water use and conservation and (2) a water supply and drought awareness and response plan. The Interstate Commission on the Potomac River Basin handles the administration of the coordinated drought response for water withdrawals from the Potomac River and during low flows. Additionally the

CO-OP sections works with COG and the Drought Coordination Committee to assist in providing accurate and timely information to basin residents during low-flow conditions in the Potomac.

L. NEW LAWS OR REGULATIONS

1. Amendments to the Chesapeake Bay Regulations

The Chesapeake Bay Local Assistance Board amended the Chesapeake Bay Preservation Area Designation and Management Regulations on December 10, 2001. While most of the basic tenets of the Regulations remain the same, there are some significant changes. The Resource Protection Area (RPA) buffers now apply to "water bodies with perennial flow" rather than "tributary streams". This means that a site-specific determination of perenniality needs to be determined, even if an RPA is not shown on the County's Chesapeake Bay Preservation Area map. This will result in an increase in the extent of Resource Protection Areas in Northern Virginia. The Northern Virginia Regional Commission hosted a workshop on the new amendments and implementation on February 21, 2002.

M. SUMMARY

Fairfax County streams and watersheds continue to be impacted by four basic problems. First is the failure of comprehensive land use planning and site design over time to adequately incorporate watershed and stream protection requirements into their decisions and to consider the cumulative effects of land use decisions on Fairfax County's streams. Secondly, at times, high levels of fecal coliform bacteria occur in specific streams throughout the County. Thirdly, stormwater runoff and erosion continue to be the largest problems within Fairfax County streams. Most Fairfax County streams have increased runoff flows that exceed the capacity of their stream channels. This has created an ongoing erosion cycle that includes eroding stream banks, heavy sediment loads, and sedimented stream bottoms. This erosion cycle persists for years, if not decades, until the stream channel widens to accommodate the flow. This has resulted in erosion problems throughout the County on trail systems, homeowners' backyards, business' landscapes, and transportation infrastructure such as bridge abutments. In addition, these ongoing erosion patterns have resulted in numerous large and small ponds and lakes throughout the County having enormous sediment deposition, which then requires frequent maintenance and dredging to maintain depth. Sediment on stream bottoms results in reduced habitat and diversity, and compromises food webs within watersheds. Sediment also compromises the quality of, and increases the expense of, treating the drinking water within the Occoquan Reservoir. Poor land use planning, inadequate enforcement of soil and erosion laws, and inadequate stormwater management in past years has significantly contributed to these

erosion problems. Only a few streams, such as those in E. C. Lawrence Park, remain undisturbed and excellent examples of healthy streams in Fairfax County.

Lastly, there is no one component of the Fairfax County government responsible for the management and protection of the County's streams or environment. County stream assessment and protection have been parceled out to various agencies., Conflicting results have occurred as stormwater management strategies and policies have conflicted with waivers granted by other departments which often result in degraded stream habitat**.** However, as long as the rate of stream degradation surpasses stream protection and restoration efforts in Fairfax County streams, the trend will continue to be a downward one.

Some very positive steps have been taken in the past two years to address these chronic long term problems:

1) The reformation of the Environmental Coordinating Committee under the Deputy County Executive and the work and guidance of the Environmental Coordinator have done much to move towards more coordinated efforts.
2) The Fairfax Stream Protection Strategy Baseline Assessment in 2000, the amendment to the Policy Plan to address stream protection, passed in October 2000, and the stormwater management recommendations of the Infill and Residential Development Report in 2000 are significant first steps in addressing many of these issues.
3) The initiation and funding of the Watershed Management Planning efforts and the Perennial Stream Mapping Project in the Stormwater Management Division are important and necessary first steps in good watershed protection and management.

All of these efforts indicate a significant change in County policy and practice towards the protection and restoration of County streams.

N. RECOMMENDATIONS

1. EQAC strongly supports the implementation of a Comprehensive Countywide Watershed Management Program.

   Fairfax County's stream and other water resources are a legacy to preserve and protect for today's citizens and future generations. The well conceived and well–done countywide stream assessment report was released in January 2001. This underlying scientific examination of existing stream conditions is being and should continue to be used to create a well-coordinated and well-planned effort to establish priorities to protect, restore, and monitor changes to these resources using watershed and sub-watershed based strategies. EQAC strongly endorses the work of the county Board and staff in these efforts.

   Along with the new Stream Protection Strategy rankings and management recommendations, this program should also include:

a) Coordination of and ongoing assessments of existing watersheds, to include point and non-point sources, including amounts of impervious surface and vegetative cover;

b) Maintenance of inspection and maintenance of County BMPs at the highest level;

c) Provision of funding at a level that is adequate to create and implement a fully functional stream protection program;

d) The coordination of all relevant water quality and stream data and data analysis from all sources within the DPWES Stream Protection Strategy and Watershed Management Program; and

e) A process through which all waivers from County agencies that would affect water quantity or quality in Fairfax County streams must be reviewed and either accepted or denied by the stormwater management program responsible for watershed planning (i.e., the Stormwater Planning Division of the Department of Public Works and Environmental Services).

2. EQAC recommends the funding of the Stormwater Utility Program/Watershed Protection and Restoration Program.

   This program should include the following conditions:

   a) Equal importance devoted to environmental protection, restoration, and monitoring as compared to infrastructure improvement and maintenance; and

   b) Establishment of a Watershed Board to oversee such a program and to ensure that the above conditions are met.

   c) Implementation of this should follow the recommendations of the Forested Wetlands Committee, which includes a careful examination of each site to ensure that disturbances to wetlands and other unique environmental features are minimized. It should also include structures and practices that allow bioretention and recharge to aquatic systems, and other innovative practices.

3. EQAC recommends posting of affected County streams with a health warning for fecal coliform bacteria until such time that the problem of high fecal coliform bacteria levels in the County's waters is mitigated.

   County streams have continued to show high coliform counts. A Total Maximum Daily Load (TMDL) for coliform has been developed for Accotink Creek and Four Mile Run due to excessive coliform counts. The sources of the pollution hand have been identified and steps need to be taken to remediate the problem. Human coliform has been found to be present in significant amounts. Until such a time as remediation is made, EQAC recommends the posting of signs in County streams with high coliform counts and/or a

broad public information campaign that contains the following from the 1999 Health Department report: *"The use of streams for contact recreational purposes, such as swimming, wading, etc. which could cause the ingestion of stream water or possible contamination of an open wound by stream water, should be avoided".*

4. EQAC recommends selective monitoring on the efficiency of stormwater management ponds, other BMPs, and the effectiveness of required erosion and sediment control procedures and structures and enforcement regimes.

   While the overall reports, the Health Department Report, and the Stream Protection Strategy Baseline Study (DPWES), indicate that Fairfax County streams have degrees of degradation, the specific causes are unclear. In some cases such as Kingstowne, there is adequate monitoring and remediation, when required, has occurred. In other cases, such as Lake Martin, citizens were placed in the unfortunate position of having to monitor and document the degradation due to failed or inadequate stormwater management facilities and inadequate soil and erosion enforcement.

   We are, however, unclear as to which structures and requirements are effective and under which conditions these measures are working well in Fairfax County. The continued granting of stormwater management waivers would appear to further degrade streams in spite of claims to the contrary. However, there are no data to support either side of the argument other than the fact that streams continue to be degraded. Data should collected.

LIST OF REFERENCES

2001 Stream Water Quality Report, Division of Environmental Health, Fairfax County Health Department

2001 Annual MS4 (Multiple Separate Storm Sewer System) Report for Fairfax County

Audubon Naturalist Society Water Quality Monitoring Brochure

Audubon Naturalist Society Water Quality Monitoring Program Report**,** Cliff Fairweather, ANS Water Quality Coordinator, September 5, 2002

Bacteria Source Tracking and TMDL Development in Accotink Creek, Douglas Moyer & Kenneth Hyer, U.S. Geological Survey, Richmond, VA

Biology (Fifth Edition), Helena Curtis,1989, Worth Publishers, Inc.

Department of Environmental Programs, Metropolitan Council of Governments, response to EQAC request for information, Jim Shell, Principal Water Resources Planner, June 28, 2001

Ecological Study of Gunston Cove, Departments of Environmental Science and Policy, and Biology, George Mason University, R. Christian Jones and Donald P. Kelso, December 31, 2001.

Estimating Nonpoint Fecal Coliform Sources in Northern Virginia's Four Mile Run Watershed. George Simmons, Donald Way, Sue Herbein, Sharon Myers and Ellen Walker

Fairfax County Coordinating Committee Report, February 4, 2002, *Status of Total Maximum Daily Load(TMDL) for Accotink Creek*

Fairfax County Department of Public Works and Environmental Services, Stormwater Planning Division, Fred Rose, Chief, April 26, 2002.

Fairfax County Maintenance and Stormwater Management Division response to EQAC Request for information, Steve W. Aitcheson, Deputy Director, June 5, 2002

Fairfax County Department of Public Works and Environmental Services, Office of Site Development Services Report, Jeffrey L. Blackford, Deputy Director, April 30, 2002

Fairfax County Park Authority, Resource Management, Response to Request for information, Lee Stephenson, Division Director, April 26, 2002

Fairfax County Stream Protection Strategy Program Reports, December, 2000 and January 2001

Fairfax County Water Authority Report- report dated April, 2002

Fairfax County Health Department, Information for the 2002 Annual Report, Carol S. Sharrett, April 23, 2002

Infill & Residential Development Study, 2000, Department of Planning and Zoning, Department of Public Works and Environmental Services, Department of Transportation

Lake Barcroft Watershed Improvement District letter and reports, Stuart Finley, Director of Operations, May 8, 2001

Metropolitan Washington Water Supply and Drought Awareness Response Plan: Potomac River System, Washington Council of Governments Board Task Force on Regional Water Supply, Updated May 2 ,2001

Northern Virginia Regional Commission Report, *Fecal Coliform TMDL (Total Maximum Daily Load) Development for Four Mile Run, Virginia*, Northern Virginia Regional Commission, February 15, 2002

Northern Virginia Regional Commission 2002 Update, Northern Virginia Regional Commission, David Bulova, Director of Environmental Services, May 3, 2002

Reston Association Letter and Information on Reston Watershed Action Group and the Reston Watershed Management Plan, Diana Saccone, Reston Association Watershed Manager, July 15, 2002

Reston Association EQAC Water Resources Update, Diana Saccone, Watershed Manager, Reston Association and *2002 Reston Lakes Monitoring Synopsis,* Bill Kirkpatrick and Keven Laite, Aquatic Environment Consultants.

U.S Geological Survey Office of Groundwater, US Department of the Interior.

Upper Occoquan Sewage Authority (UOSA) 2001 Report

Upper Occoquan Watershed Monitoring Laboratory Report (OWML),Adil Godrej, June 20, 2002

Virginia Chesapeake Bay Local Assistance Department Letter and Attachment, *Local Program – Phase II, Fairfax County #74,* Michael Clower, Director, March 29, 2001

Virginia Department of Forestry Contribution to the Fairfax County Annual 2001 Report on the Environment

Virginia Department of Environmental Quality, Chesapeake Bay Program, John Kennedy, April 17, 2002

Virginia Department of Environmental Quality Fairfax County Multiple Separate Storm Sewer System Reissuance Permit letter and permit copy, Charlie Forbes, Assistant Division Director, Permitting and Water Resource Development, January 24, 2002

Virginia Department of Environmental Quality Response and Data on Water Issues, Charlie Forbes, Assistant Division Director, Permitting and Water Resource Development, May, 2002

Wetland Habitats, Dave Brown and John Coleman, Maintenance and Stormwater Management Division, Department of Public Works and Environmental Services.

Washington Area Council of Governments, Brain LeCouter, Urban Forester/Environmental Planner, *Urban Biodiversity Information Node: Holmes and Tripp Run Watershed Pilot*

OTHER DATA

Data from the US Geological Survey Report on Aquatic Vegetation in the Potomac 2000, Nancy Rybicki, and the 2000 Potomac Aquatic Plant Control Program Summary Report, (Potomac Aquatic Plant Management Committee, Washington Council of Governments, June 25, 2001)

will be incorporated into a new Potomac section in the 2003 Annual Report on the Environment)